sis of the extremities, and sensory and sphincter disturbances occur. In measles symptoms usually come on after defervescence and when the patient has fully recovered. The mortality in this complication following measles is approximately 10 per cent; persisting sequelae have been noted in severe cases (Wilson). The pathology has been studied in six cases by Ferraro and Scheffer, who found perivascular proliferation of microglial elements dominantly located in the white substance. Occasionally, there were scattered hematogenous cells. Accompanying this proliferation was a concomitant perivascular demyelination. It seemed evident to these investigators that the noxious agent was carried from the blood vessels to the surrounding tissue. They suggested the term encephalophy, because the pathology was different from the typical inflammatory type.

MYELITIS FOLLOWING INJECTION OF FOREIGN SERUM

In susceptible individuals, this reaction may occur after inoculation of sera, specific or otherwise, but is most often observed after the administration of antitetanus serum, probably because of the frequency of its use. This reaction to foreign serum occurs in the process of sensitization—the patient becomes anaphylactic. Symptoms occur from seven to fourteen days after injection. Generalized symptoms are headache, nausea, vomiting, joint pains, and urticaria. There is a wide variance in the distribution of the nervous lesions. Symptoms referable to the brain, cord, spinal roots, and nerves have been described. Thus, paraplegic and Landry's types have been reported, as well as types resembling multiple sclerosis. The characteristic spinal picture is a paralysis of muscles supplied by the fifth and sixth spinal roots (Erb-Duchenne type of brachial palsy). The pathology predominantly affects blood vessels: vasodilatation, edema, and petechial hemorrhage. Exceptionally, cellular infiltration with necrotic areas in the parenchyma occurs. The spinal fluid may contain a moderate pleocytosis and be under pressure, which symptoms disappear with the urticarial lesions.

CONCLUSIONS

The close resemblance between nervous sequelae following vaccination and following infectious fevers (also serum sickness) has long been recognized. It has been previously suggested that either there is a delayed action of the causative infection, or that the symptoms represent an anaphylactic effect, or that the body is so conditioned by the initial disease as to render it susceptible to other and independent diseases. When attention was first called to the post-vaccinal myelitis, it was thought to be a latent manifestation of epidemic encephalitis.

A close relationship appears to exist between Landry's paralysis, as now reported in the literature, neuronitis, and the Guillain-Barré syndrome. I am convinced that at least neuronitis and the Guillain-Barré syndrome are closely related, and may be identical. Differences in the clinical picture and course may be due to the variations of type and virulence so often met with in virus affections. Landry's paralysis, as clearly defined by Landry himself (assuming that the cerebrospinal fluid was not altered) may be a definite disease entity, or perhaps a deficiency state. This latter is the position of Madeleine Brown. However, in a personal case recently observed, there was no response to large doses of Vitamin B and the patient succumbed. Since the publication of Doctor Brown's article, I have come across no reports of the specificity of Vitamin B therapy in Landry's paralysis.

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REFERENCES

1. Ferraro, A.: Primary Demyelinating Process of the Central Nervous System. An Attempt at Unification, Arch. Neurol. and Psychiat., 37:1100 (May), 1937.
2. Lhermitte: Quoted by Ferraro, loc. cit. Page 1150.
3. Landry, O.: Note sur la Paralysie Ascendante Aigue, Gaz. Hedb. de Méd., 6:472 (Jan.), 1859.
4. Brown, M. R.: Etiologic Study of Landry's Original Case of Acute Ascending Paralysis, Arch. Neurol. and Psychiat., 40:800 (Oct.), 1938.
5. Kennedy, F.: Infective Neuronitis, Arch. Neurol. and Psychiat., 2:621 (Dec.), 1919.
6. Casamajor, L.: Acute Ascending Paralysis Among Troops, Arch. Neurol. and Psychiat., 2:605 (Dec.), 1919.
7. Guillain, G., Barré, J. A., and Strohl, A.: Sur un Syndrome de Radiculonévrite avec Hyperalbuminose du Liquide Céphalorachidien sans Reaction Cellulaire, Bul. et Mém. Soc. Méd. d. Hôp. de Paris, 40:1462 (Oct. 13), 1916.
8. Guillain, G.: Radiculoneuritis with Acellular Hyperalbuminosis of Cerebrospinal Fluid, Arch. Neurol. and Psychiat., 36:975 (Nov.) 1936.
9. De Jong, R. N.: The Guillain Barré Syndrome, Arch. Neurol. and Psychiat., 44:1044 (Nov.), 1940.
10. Hassin, G. B., and Bassoe, P.: Multiple Degenerative Softening Versus Multiple Sclerosis, Arch. Neurol. and Psychiat., 7:613 (May), 1922.
11. Hassin, G. B.: Neuroptic Myelitis Versus Multiple Sclerosis, ibid., 37:1083 (May), 1937.

SELECTIVE ANESTHESIA*

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THIS paper deals primarily with combinations of anesthetics and methods, and not with single anesthetics which may be the ones selected. Other terms which are used are combined anesthesia, balanced anesthesia (as described by Lundy in 1925), and anoci-association as originated by Crile. Anoci-association is only one type of selective anesthesia, since it consists of a local anesthesia well-fortified by preliminary medication, upon which is superimposed nitrous-oxide and oxygen anesthesia, the essential purpose of which is to destroy consciousness. Whatever the name employed, the idea is to use two or more anes-

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thetics in minimal amounts, instead of a large dose of one anesthetic which may be dangerous to the patient.

ADVANTAGES OF SELECTIVE ANESTHESIA

Some of the factors which make selective anesthesia safer than large doses of single anesthetics are:

1. Stimuli to the central nervous system are decreased or eliminated, thus diminishing the amount of general anesthesia necessary.
2. The exhaustion caused by nervous tension of some patients under local anesthesia alone is eliminated.
3. Patients having received small doses of anesthetics respond quicker, and normal reflexes return sooner.
4. Large doses of anesthetics, especially spinal for the poor-risk patient, are extremely dangerous.
5. Shock from deep cyclopropane and ether anesthesia is eliminated.

As new agents and methods are introduced, and we become acquainted with them, we gradually work them in with other agents and methods. At the present time a good anesthetist should have enough agents and methods available to carry out almost any procedure with a minimum of risk to the patient's safety. If one method is considered unsafe, it should be discarded for a safer method or combination of methods and agents.

Indications and contraindications for various combinations of anesthetics will not be discussed. Only those combinations with which I am familiar and have found useful on many occasions, will be touched upon. Undoubtedly there are other useful anesthetic combinations.

AUTHOR'S OBSERVATIONS

Selective anesthesia for the bad-risk patient is usually based on local anesthesia: either some type of block or infiltration carried out by the anesthetist, or local infiltration administered by the surgeon. If the surgeon carries out the local anesthetic procedure, it is sometimes necessary to explain to him that, even though the patient is under the influence of a general anesthetic, the local still carries out a definite purpose and should not be abandoned after the first skin infiltration.

Skull and Brain.—Operations on the skull and brain can be carried out under many combinations of anesthetics. In patients with mental stupor or partial unconsciousness, local anesthesia or field block is desirable. Occasionally this type of patient may be uncoöperative, but can be very easily controlled with safety with small doses of 2½ per cent pentothal injected into the vein, or injected with intravenous solutions, or with one of the many special sets of apparatus used for intravenous anesthesia. The effect of the pentothal should be worn off by the time the operation is over. Avertin is not as suitable for this type of patient because of its uncertain action, long duration, and because of the occasional fall of blood pressure which accompanies its administration. After the patient has been controlled at the start of the operation, the pentothal may be sometimes discontinued and the operation carried out under local anesthesia alone. More pentothal may be added, later, if necessary. Some patients object to the administration of the local and here again pentothal may be administered to prevent the pain of the injection and then discontinued after the local is complete.

Avertin, combined with local, serves well for brain operations in patients in good condition. If the avertin and local do not give enough anesthesia, they may be supplemented with intravenous anesthesia. Small amounts of pentothal may be safely added to control the patient. If a free airway is deemed essential for a particular case, it may be necessary to administer nitrous-oxide and oxygen, and possibly a small amount of ether to facilitate easy introduction of the endotracheal tube. An obstructed airway increases intracranial pressure, and a free airway is necessary to permit easy artificial respiration.

Eye.—In operations on the eye when pentothal is to be used, it is helpful to use topical anesthesia also. This seems to prevent some of the sneezing and coughing sometimes encountered.

Teeth.—When pentothal is to be used for extraction of teeth in a noninfected area, a quick injection of novocain-adrenalin solution will cut down on the bleeding, allay some of the immediate postoperative pain, and decrease the total amount of pentothal required.

Thyroidectomy.—For poor-risk patients undergoing thyroidectomy, I feel that local anesthesia again is the basic anesthesia, with the order of anesthesia reversed; that is, the local is given after the patient is unconscious. For the very toxic patient, I prefer either a small basic dose of avertin or intravenous anesthesia administered preliminary to the local. Local anesthesia alone often upsets the toxic thyroid patient. If pentothal is to be used, oxygen should also be given. If it is necessary to awaken the patient during surgery, one may start the anesthesia with pentothal and after a small dose has been administered, nitrous-oxide and oxygen are given and the patient can be awakened at the desired time. Heavy premedication plus local anesthesia is a good form of combined anesthesia which may be satisfactorily used in the nontoxic thyroid in the placid type of individual.

Thoracic Surgery.—For extra pleural thoracic surgery, heavy premedication plus local plus nitrous-oxide and oxygen give a combination which allows the use of the electro-surgical unit. By heavy premedication is meant the use of basal avertin or the usual premedication plus intravenous morphine prior to the administration of the inhalation anesthetic. Both of these combinations are explosion-proof and fire-proof. In some cases the local may be left out and sufficient anesthesia can be obtained without using a more potent agent than nitrous-oxide. For intrapleural work where cautery is to be used, the same com-

bination may be used plus endotracheal intubation.

Abdominal Surgery.—Abdominal surgery offers the greatest opportunity for various combinations of anesthetics. Local infiltration and abdominal block form the basis for selective anesthesia in the poor-risk patient. Abdominal block is preferred because it gives more relaxation of the abdominal muscles. In abdominal block it is important that the solution be injected into the lateral border of the rectus sheath, since it is at this point that the nerves may be most easily reached with some accuracy. Tovell's technique, of making four or five separate injections into the lateral border of each rectus sheath, is one which the surgeon can very easily become acquainted with and use in many cases. This can be done while the anesthetist is administering the general anesthetic. With a good abdominal block, procedures in the abdomen can be carried out in the poor-risk patient with very light general anesthesia with nitrous-oxide, ethylene, cyclopropane or pentothal. If pentothal is to be used, it is wise to give oxygen simultaneously. The addition of nitrous-oxide, not to exceed 50 or 75 per cent, will reduce the amount of pentothal necessary, and still allow good oxygenation to be carried out. Cyclopropane is better if more relaxation is desired. The adrenalin in the local anesthetic should be omitted if cyclopropane is to be used. Spinal anesthesia is not desirable in the poor-risk patient for upper abdominal surgery. Bilateral intercostal nerve block, of the fifth through the eleventh thoracic nerves, is another type of block which gives good relaxation of the abdominal muscles, and may be used instead of abdominal block. However, if it is not done frequently, it is more time-consuming, and means a greater number of needle punctures for the patient to endure.

In the better-risk patient, small doses of spinal anesthesia plus cyclopropane is a very good combination for abdominal surgery. By small doses of spinal anesthetic, I mean not over 135 to 150 mg. of procaine hydrochloride or corresponding amounts of other drugs. The administration of cyclopropane and oxygen permits good oxygenation of the patient and tends to keep the blood pressure elevated, or does not allow the ordinary fall in the usual case. Pentothal may be used in combination with spinal anesthesia to control nausea or produce unconsciousness. However, if the spinal wears off while the abdomen is still open, pentothal may not give enough relaxation for an easy closure. If the blood pressure is low, it is best not to administer pentothal, since it may cause a further fall of blood pressure, and depression of respiration, which may be difficult to overcome. One must be prepared to administer oxygen at any time.

Kidneys.—For operations on the kidney, one of the safest combinations for the poor-risk patient is a paravertebral block of the eleventh and twelfth thoracic, and first and second lumbar nerves, plus infiltration of the line of incision plus pentothal and oxygen, or the block plus cyclopropane and oxygen. Small doses of spinal anesthetic, plus nitrous-oxide or light cyclopropane or pentothal anesthesia, are also very good combinations for kidney operations in the better-risk patient.

CONCLUSIONS

For the poor-risk patient in which the operative procedure cannot be carried out under local anesthesia alone, local or regional anesthesia, and light inhalation or intravenous anesthesia, form the safest combination in a great number of cases. Small doses of spinal anesthetic plus cyclopropane are also a popular method of selective anesthesia.

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CLINICAL NOTES AND CASE REPORTS

EPIDEMIC KERATOCONJUNCTIVITIS: "SHIPYARD EYE"

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SINCE September, 1941, when the epidemic of the keratoconjunctivitis appeared in San Francisco Bay area, there have been occasional outbreaks. Reported cases at this time are relatively mild, and acute symptoms may last a few days instead of several weeks, as was the experience in 1941. Although popularly known as "shipyard eye," cases are by no means confined to shipyard workers.

The onset of the condition is usually sudden. Outstanding symptoms are a sensation of irritation and scratching in the eye, marked lacrimation, slight photophobia, some blurring of vision, and moderate dull pain in the eyeball. Pain and soreness in the preauricular area on the affected side are common symptoms. Many patients also complain of the eyelids sticking together in the morning on awakening.

Physical examination shows the presence of varying degrees of inflammation and hyperemia of the bulbar and palpebral conjunctiva. In severe cases the bulbar conjunctiva is characterized by extreme, glassy edema, and occasionally subconjunctival hemorrhages are present. A thin membrane is sometimes found attached loosely to the palpebral conjunctiva, or lying in the lower cul-de-sac. Neighboring lymph glands and the preauricular gland on the affected side are swollen, and tender in most cases. In some patients who, at first, had only one eye affected, the condition later extends to the other eye.

Some of the individuals who have contracted this condition have developed multiple minute

* A statement by the Bureau of Industrial Health of the California Department of Public Health, Berkeley, California, December, 1942.